TITLE: A randomized controlled trial comparing two doses of spinal bupivacaine for total knee arthroplasty and the impact on recovery time

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INTRODUCTION: Prolonged recovery times in post anesthesia care unit (PACU) lead to delays and potential cancellations of subsequent operative cases. At our institution discharge from PACU requires spinal regression to a level of T8 or below, and postoperative regional blockade is performed after regression to T12. The purpose of this study was to assess the effect of reducing the dose of spinal isobaric bupivacaine for unilateral total knee arthroplasty on recovery time.

METHODS: In this triple-blinded randomized controlled trial patients admitted for unilateral total knee arthroplasty for osteoarthritis were assigned to receive a lower dose (9mg) or a higher dose (13mg) of spinal isobaric bupivacaine with the same dose of fentanyl and morphine. The primary endpoint was time from arrival to PACU to sensory regression to T12. Secondary endpoints were sensory dermatome on arrival to PACU, time of spinal injection until regression to T12, conversion to general anesthesia (GA), use of vasopressors, supplemental intraoperative analgesia, and duration of surgery. Data analysis included t-test, chi square, Mann Whitney U, relative risk and Cox proportional hazards modeling.

RESULTS: 140 patients were randomized to each of two groups (55 males and 85 females). Mean age was 70 years and mean BMI was 31. Demographic characteristics were not different between groups. Time from arrival in PACU to T12 was 0:57h (sd=0:51) in the lower dose group and 1:37h (sd=0:58) in the higher dose group (Mann Whitney U=1460, p<.01). Fifty percent of patients in the lower dose group had achieved sensory regression to T8 upon arrival to PACU compared to 31% of the higher dose group (RR=1.6, 95% CI 1.1, 2.4). Mean time from injection to T12 was 2:42h (sd=0:45) vs. 3:17h (sd=0:49) (t=4.2, p<.01). Surgery time (1:20h vs. 1:20h) and time from spinal injection to incision (0:12h vs. 0:13h) were not different between groups. Three patients in the lower dose group and 2 in the higher dose group required conversion to GA. When patients who were converted to GA were excluded from the analysis the time to T12 was 2:44h vs. 3:19h. Patients in the higher dose group were more likely to require vasopressors (26% vs. 10%, RR=2.6 (95% CI 1.1, 5.8), while patients in the lower dose group were more likely to require supplemental intraoperative analgesia (13% vs. 2.9%, RR=4.5 (95% CI 1.0, 20.1). After controlling for vasopressor use, analgesic use, and conversion to GA, time to T12 remained significantly higher for the higher dose group (RR=2.1 (95% CI 1.5, 3.1; p<.01).

DISCUSSION: This study demonstrated that lowering the dose of spinal isobaric bupivacaine for unilateral total knee arthroplasty reduced immediate postoperative recovery time by 40 minutes leading to earlier achievement of discharge criteria and the performance of postoperative regional blockade.